Lab on HW-SW digital systems codesign
SEL B.Sc. Curriculum (Spring Semester)
Embedded Systems Laboratory
EPFL-STI-IEL

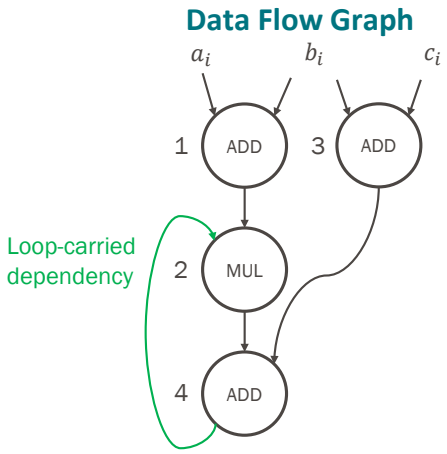
Exercises Session 3
Out: 2025-03-06

Scheduling of operations in HLS

1 Exercise 1

Starting from the following piece of C code:

```
int temp = 0;
for( int i=0 ; i<100 ; i++ ) {
  temp = (a[i] + b[i]) * temp + (b[i] + c [i]);
}
```



and assuming the following conditions:

- $t_A = 6\,\text{ns}$
- $t_M = 9\,\text{ns}$
- $t_R = 0\,\text{ns}$
- Timing model: $T_L = \#\text{iterations} \times \text{II} \times T_{clk}$
- Resources model: $C_R = 2 \times \#\text{ADDs} + 3 \times \#\text{MULs} + 1 \times \#\text{REGs}$

Perform the scheduling and allocation of the following settings (with the same format as in the slides):

- ASAP II=2 II=3
- ALAP II=2 II=3
- $T_{clk} = \text{min}$
- $T_{clk} = 15\,\text{ns}$

Put these solutions into the design space and respond to the following:

▶ **Question:** *What solution(s) are in the Pareto optimal curve?*

▶ **Question:** *Can you tell which scheduling solution is better independently of the source code: ASAP or ALAP?*

Additionally, create one binding scheme and an FSM table (as in the slides) for any of the ASAP or ALAP (II=2 or II=3) with $T_{clk} = \text{min}$.